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Remote Transformer Faults Analyzing System using IoT

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ABSTRACT

Transformers are underlying and necessary constituent of Electrical distribution and transmission system. So as to prevent the big-budget repair interruption for trouble free power supply, we need to examine the transformer on regular basis. These devices are high-priced part of distribution system. Because of this, we tend to get huge power outage. The paper is about the studies of live monitoring and fault recognition methods of intelligent power transformer to make sure the safety and reliability of the power function of an transformer. The important intention is to meet the requirements for the fast measurement and to inspect the parameters like voltage and current of the transformer, temperature of oil, level of oil in the transformer and also we frequently check whether there is any spark, flame or smoke and send the alert message accordingly.

Keywords: Transformer, Arduino UNO, Voltage sensor Spark sensor(light sensitive photoresistor LDR), Oil level sensor(HW-103), Temperature sensor(DHT11), Smoke sensor(MQ-6), Flame sensor(KY-026)

1. INTRODUCTION

Transformers have an important role to play by delivering reliable power supply to shape up the smart cities in the transformer low oil level is one of the most important reason for the misfiring of transformer, overloading, unbalance loading, overheating of transformer oil, defective breather and consequent ingress of moisture. The main intent is to develop the system to monitor the real status of the transformer, and also to shrink cost, enhance services to customers and upsurge efficiency. To bring down the possibilities of unexpected failures and outages live monitoring has a main role to assess the state of the transformer since its stable operation is important.

2. PROPOSED SYSTEM

By implementing the IOT, the smart system will replace the manpower position. Our proposed system consists of various elements such as Voltage sensing instrument, Current sensing instrument and temperature

sensing instrument and an oil level sensing instrument for monitoring various parameters of a transformer All of the parameter changes will be notified with the help of IOT using Blynk App. An alarm will be ON if any changes occur. Here we have used current and voltage sensors to monitor voltage and current parameter changes. We use a Arduino UNO to share all the information to the required person.

3. BLOCK ILLUSTRATION

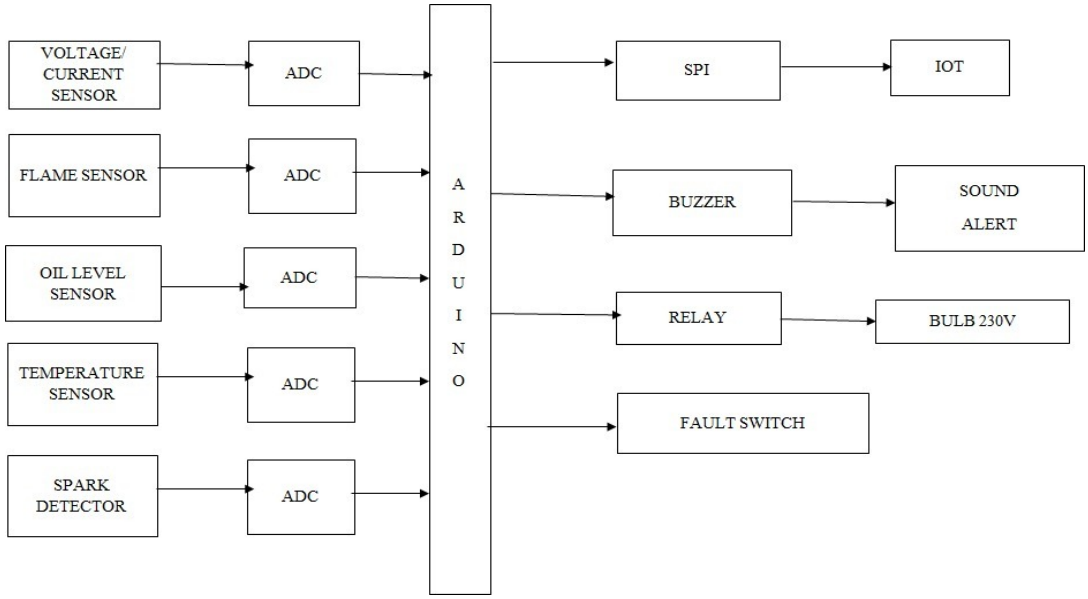


Figure 1. Block illustration

4. CIRCUIT DIAGRAM OF THE PROPOSED METHODOLOGY

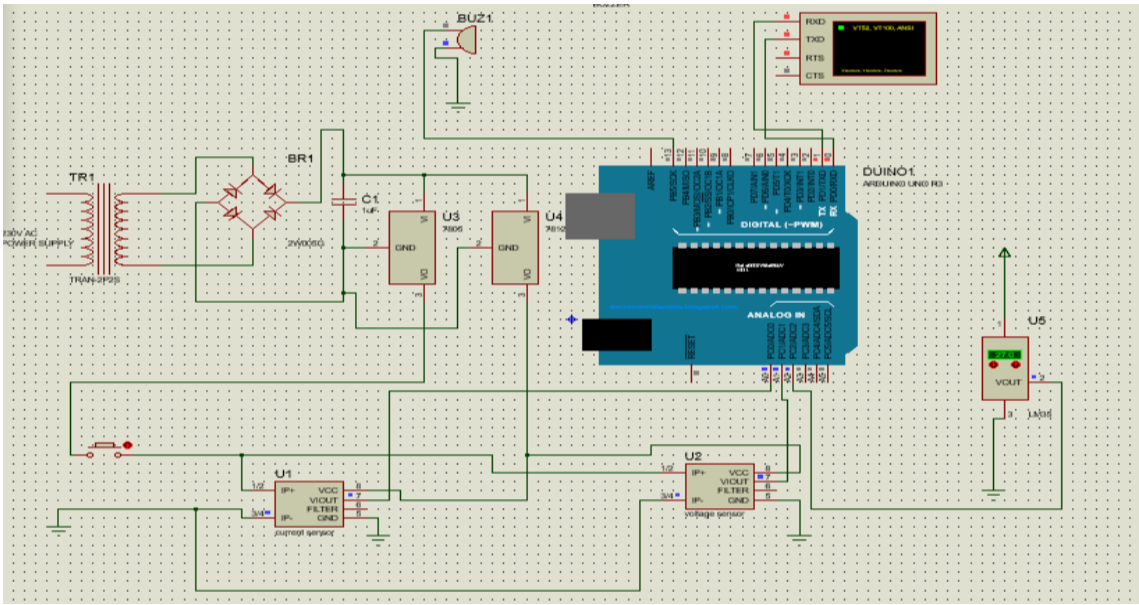


Figure 2. Circuit Diagram

5. HARDWARE USED FOR THE PROPOSED METHODOLOGY

- ATmega328p
- Current measuring device
- Voltage measuring device
- Oil level measuring device
- Temperature measuring device
- Flame measuring device
- Smoke measuring device
- Relay module

5.1 ATmega328P

The Atmega328P has 128KB memory unit of non-volatile storage for storing code (of that 4KB memory unit is employed for the boot loader), 8KB memory unit of SRAM and 4KB computer memory unit of EEPROM. Every fifty four pins of the Mega is configured to associate both inputs and outputs by its corresponding Arduino C functions.

Figure 3. Figure of ATmega328P

5.2 CURRENT SENSOR

This is a measuring device that spots current either AC or DC and produces appropriate signal to it. The wave that is produced will be either current or digital output. This is generally needed to show the current that spotted in the ammeter. In few cases it is stored for future analysis in a DAQ system or for the purpose of controlling.

Figure 4. Figure of current sensor

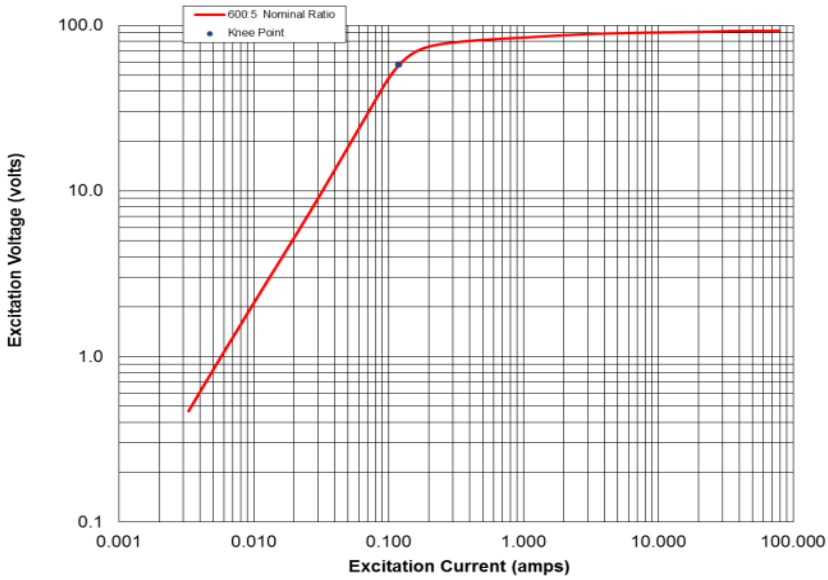


Figure 5. Output characteristics of current sensor

5.3 VOLTAGE SENSOR

Suitable circumstances when potential skill is an problem in Voltage measuring device encourage checking of contribute voltage levels. it recognize below voltage or overvoltage have to do with and help ensure basic engines and

Figure 6. Voltage measuring device

gadgets. Since they have an industry-standard 4–20 mA yield they are handily coupled to an information lumberjack board meter or PLC for ongoing observing and detailing.

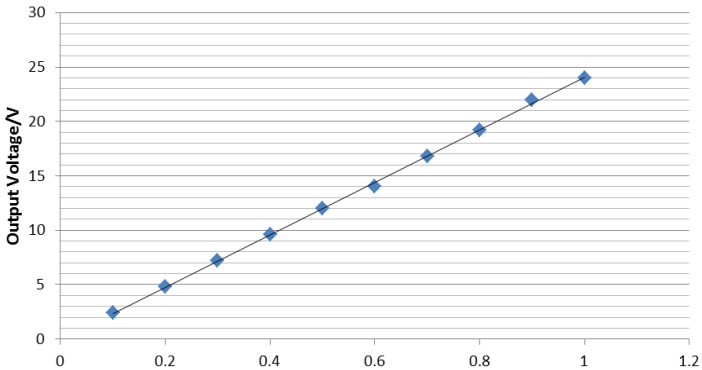


Figure 7. Output characteristics of Voltage sensing element

5.4. OIL MEASURING DEVICE

Oil volume measuring device measure oil content in transformer. An oil volume measuring device probe made up of multiple sensing elements.

Oil volume measuring device work constant manner in ancient flow handle job, aside from it's perform oil rather than aqua. Oil volume measuring device use fascinating get handle it remotely airtight with very unsoiled steel or ductile cane, to find oil volume and mechanically activated.

The handle progress elivate and downturn to interruption in circuits in keeping with oil volume increasing or decreasing. When lubricant within the cistern reached when base predicted end the read handle can produce a closed loop and mechanically messaging a symptom to your tube to fill up the tank with the required oil once more.

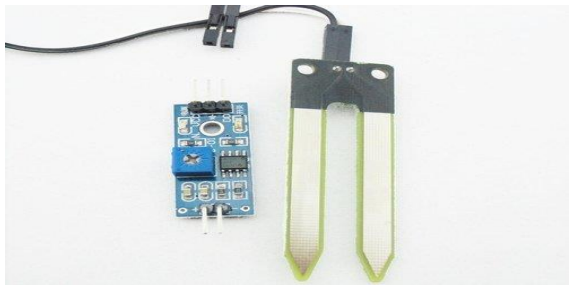


Figure 8. oil Level Sensor

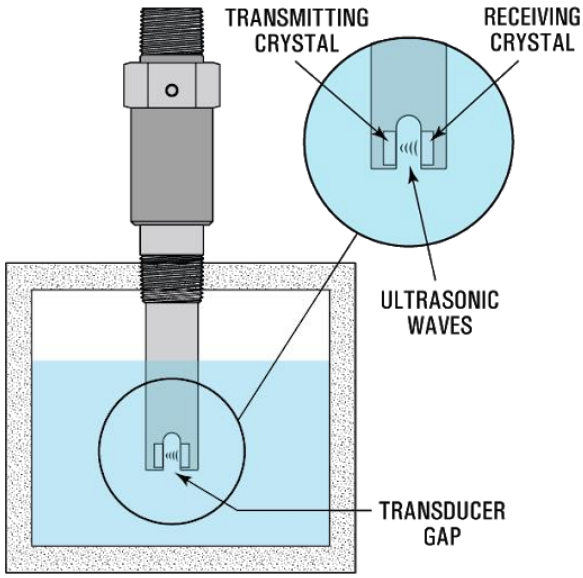


Figure 9. Oil Level Sensor

5.5 TEMPERATURE SENSOR(LM35)

The LM35 progression is a accuracy IC temperature sensing element, in which its voltage is linearly equivalent to degree Celsius.

It also has a additional benefit when compared to linearly equivalent sensing element tagged in (K) since the operator need not compute an oversized voltage from the result to get the easier degree Celsius scaling.

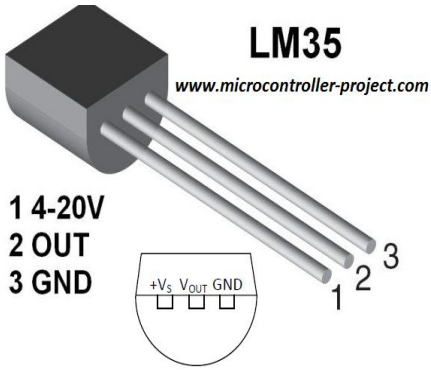


Figure 10. Temperature sensing element

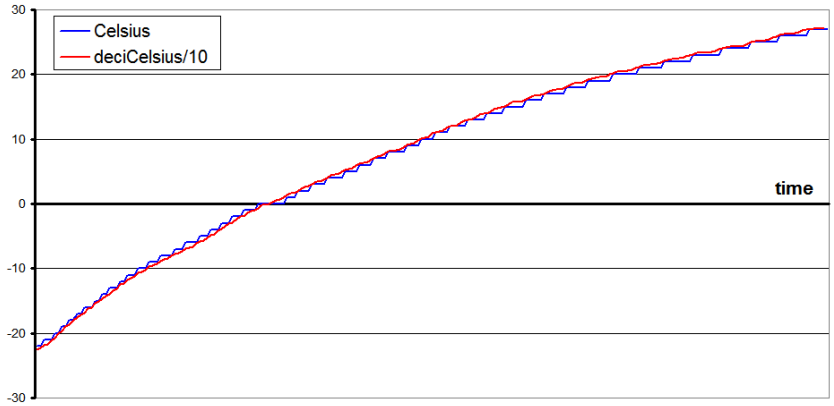


Figure 11. Output characteristics of Temperature

5.6 FLAME MEASURING DEVICE

The flame measuring device is one new sort of pointer that's principally plotted for checking and immediately acknowledge to the incidence of the flame. It generally combines gas line, fuel , alarm & a fireplace subdue system.

This type of sensing element are employed in the boilers especially in industries. The important operation is to relinquish support if the boiler is correctly operating. The result from these elements are quicker still more additional correct when compared with smoke sensing element owing to the mechanism during detection of the flame.

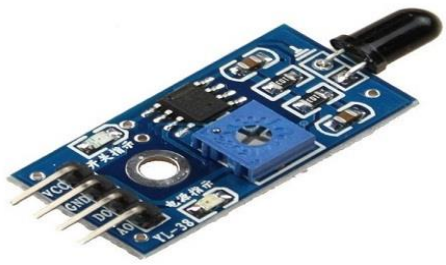


Figure 12. Flame sensor

5.7 SMOKE SENSOR

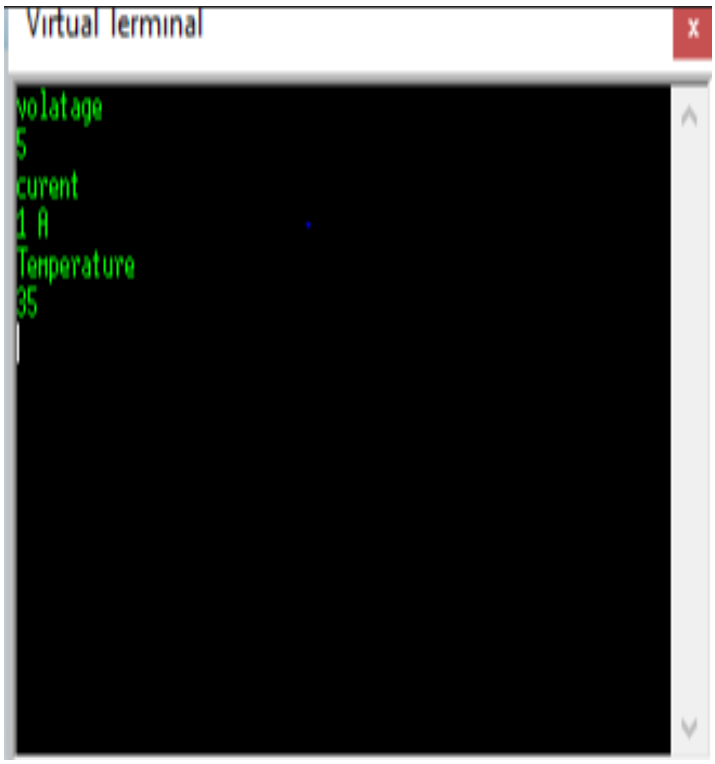
The smoke measuring device is a photoelectric fire safety equipment that robotically measures the smoke, as a key signal of fireside, and buzzer to the putting together residents.

Private enterprise and industrial smoke measuring device raise a sign to a fireplace alarming instrument as a part constitutes the central fire alarming system of the building.

Ordinary smoke measuring device, or smoke alarming system, produce an sound or sighting alarm locally from the measuring device. They are battery equipped units. They must be completely installed in all the latest buildings.

Figure 13. Smoke sensing element

6. SIMULATED OUTPUT



7. SOFTWARE USED TO CONNECT WITH IOT

Figure 14. Application inside Image of the Blynk app

8.RESULTS IN BLYNK APP

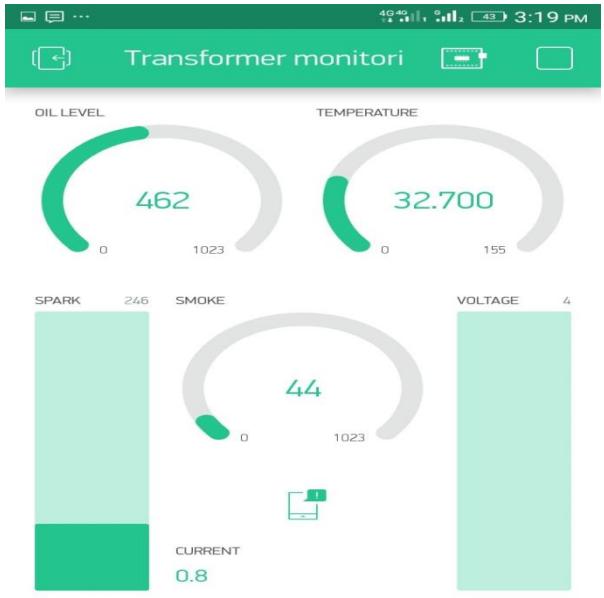


Figure 15. Overall view of Parameters

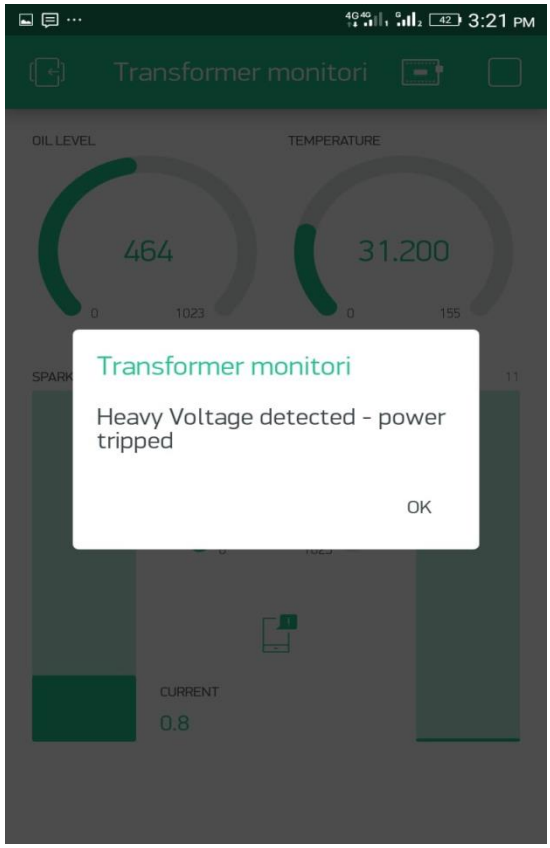


Figure 16. Alert for Heavy voltage in Transformer

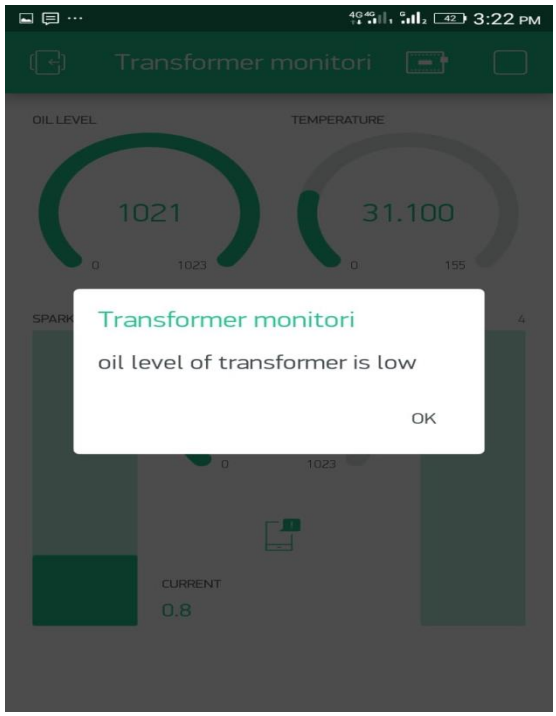


Figure 17. Alert for Oil level in Transformer

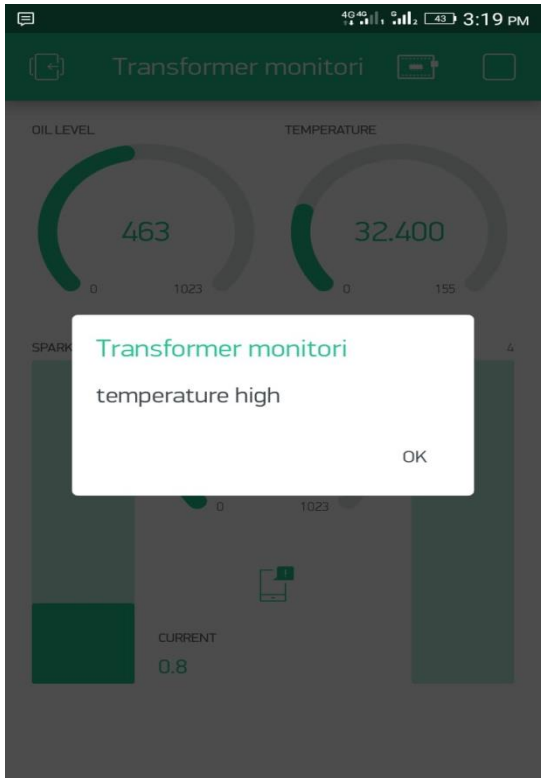


Figure 18. Alert for Temperature in Transformer

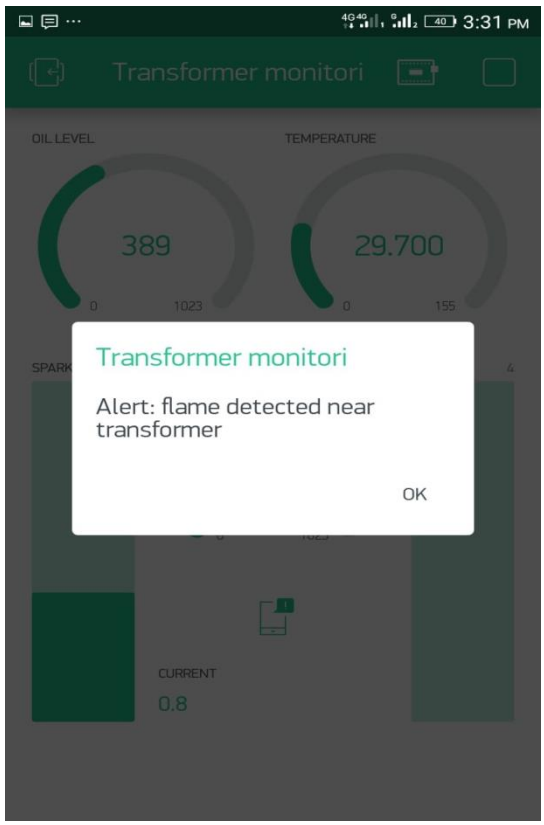


Figure 19. Alert for Flame in Transformer

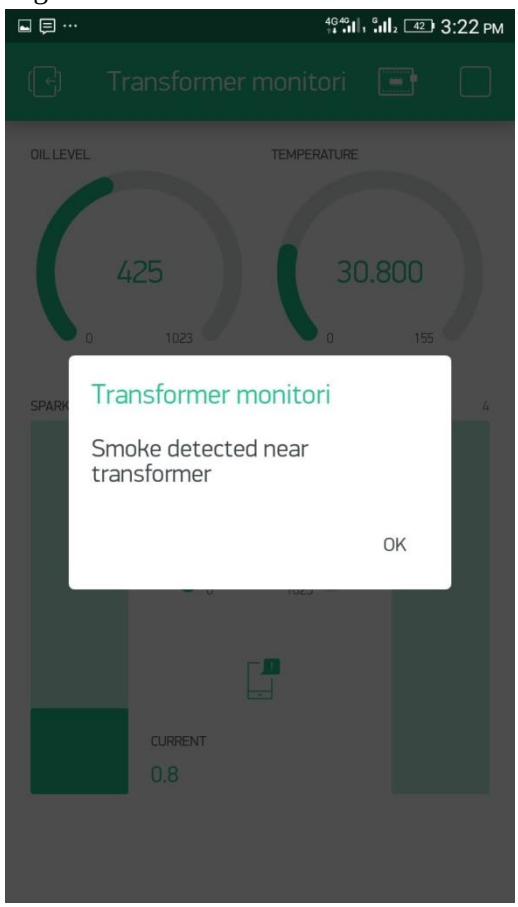


Figure 20. Alert for Smoke in Transformer

9. CONCLUSION

The wireless IOT advancement is deputed in our paper in the form of managing energy efficiently according to our needs. Practising the system for monitoring the parameters by the use of IOT that helps us to minimize the cost the drastically and diminish the power consumed. The sensing elements are responsible for checking the parameters and we obtain the result through internet in our mobile application.

This method largely shrink the use of manpower. As a result this is would become highly reliable and more accurate In this project a conceptual framework for intelligent power distribution transformers is proposed. With a rapid urbanization and industrialization, there is a high demand for uninterrupted power supply. Periodic failure of the machinery will result in break of power supply and also creates a large commercial loss to their corresponding distributers. The present transformers' health monitoring systems mainly use IoT technology.

10. FUTURE SCOPE

When we combine IoT with AI it will more effective and IoT devices will take decision on their own. The combo of AI and IoT devices makes the IoT devices in the transformer to analyze data locally, predicts the malfunctioning of transformer and fix the transformers and power supply before they break, which save from

disasters that will occur. Since this proposal is only a conceptual one, implementation of this approach in a real environment is left for feature.

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